The Michigan Department of Natural Resources Management of Walleye Production and Stocking Since Viral Hemorrhagic Septicemia Emerged in the Great Lakes Basin[1]

Introduction

Walleye fishing encompasses some of the most diverse and widespread angling opportunities in the State of Michigan. This prized fish species inhabits our Great Lakes waters, inland lakes of all sizes and shapes, and many miles of river throughout the state. When walleye fishing started gaining popularity in the 1970s, the Michigan Department of Natural Resources (MI DNR) began developing ways to rear large numbers of young walleye for stocking into Michigan lakes and rivers. Walleye production typically consists of raising fry to a total length (TL) of about 1/2 inch and spring fingerlings to a TL somewhere between 1 and 2 inches. To do this we use a combination of on-site hatchery resources and off-site rearing ponds. In the early years when walleye fishing was expanding its reputation and attractiveness among anglers, fish were stocked somewhat indiscriminately throughout the waters of the state. Over time however, fisheries managers learned which stocking efforts were most successful and adjusted their efforts accordingly. Stocking success has typically been determined by the establishment of a consistent fishery rather than incidental catches of walleye. In most cases, walleye are not stocked in waterbodies where natural reproduction is strong. Recently, introduction of the fish pathogen Viral Hemorrhagic Septicemia (VHSv) to the Great Lakes Basin has significantly altered walleye production and stocking in Michigan and elsewhere throughout the region. Prior to the introduction of VHSv, the MI DNR stocked on average 3 to 5 million spring fingerling walleye each year. In contrast, no walleye were stocked in 2007, only 850,000 fish were stocked in 2008, and stocking will again be limited in 2009. This paper describes actions taken by the MI DNR from 2006 through 2009 to manage walleye production in the State of Michigan around the presence of VHSv in our waters.

Walleye Rearing Process

Unlike some salmonid species we produce, walleye broodstock are not maintained at any state fish hatchery in Michigan. In fact, most MI DNR hatcheries are really designed for rearing trout and salmon rather than coolwater species such as walleye, northern pike, or muskellunge. MI DNR uses three wild Great Lakes sources as walleye broodstock; the Muskegon River; the Tittabawassee River; and Little Bay de Noc. Walleye egg takes occur in the early spring when ripe fish congregate on spawning grounds. The Great Lakes spawning populations used as broodstock are characterized by large fish and larger females have more eggs. Eggs are fertilized, hardened, and disinfected on location, and are then sent to either the Wolf Lake State Fish Hatchery located in Mattawan, or the Thompson State Fish Hatchery located in Manistique. After arriving at the hatchery eggs are incubated for 18 to 28 days before hatching.

Once walleye hatch from the egg they are called fry and are less than 1/2 inch long. Occasionally, fry are immersed in an oxytetracycline (OTC) bath which permanently marks their bones and enables fisheries managers to determine their status as stocked fish later in life. Fry

[1] A white paper developed by Patrick Hanchin and Tim Cwalinski, Co-chairs of the MI DNR Walleye Committee. Technical advice and detail provided by Martha Wolgamood, Wolf Lake State Fish Hatchery Supervisor and Statewide Fish Health Coordinator. White paper edited by Kurt Newman, Gary Whelan and Jim Baker. Valuable comments provided by Jim Dexter.

spend 3 to 5 days in the hatchery during which they are sustained by the nutrients in their yolk sac. Before the yolk sac is fully absorbed, fry are shipped to outdoor ponds located throughout the state for rearing to the fingerling stage. Ponds vary in size, shape, and water supply, with some collecting water from natural runoff while others receive water pumped from a local surface or groundwater source. Many of these rearing ponds are owned by private groups that participate in valuable partnerships with the MI DNR to increase the number of walleye available for stocking statewide. Rearing ponds require conditioning prior to and after the arrival of fry. It is crucial that fish predators, capable of severely limiting walleye production, are removed from these ponds before introducing fry. Ponds are further prepared for the arrival of fry by being fertilized with various organic and inorganic fertilizers to improve plankton abundance and ensure fry have an adequate food source. Technicians continue to fertilize ponds after fry are introduced so that plankton levels remain stable and available as food. As fry approach fingerling size, pond fertilization ceases and plankton levels are allowed to collapse. It is essential to remove fingerlings from the ponds prior to the collapse of plankton populations. If not removed, cannibalism will occur among these young walleye which can significantly limit production. Fry typically reach spring fingerling size between June and July and are ready to be stocked into our waters. The production of spring fingerling walleye is highly variable from year to year and pond to pond.

Fisheries managers make decisions on which waterbodies will be stocked based on production levels and management needs. Recommended stocking rates for spring fingerling walleye are 25 to 100 fish per acre, with appropriate levels determined through experience and success establishing a consistent fishery in a particular lake over time. To the degree possible, biologists attempt to use an "appropriate genetic strain" of walleye when stocking lakes in a given management unit. For example, an inland lake which drains to Lake Michigan in the Lower Peninsula typically receives Muskegon River strain walleye because that river also drains into Lake Michigan. There are instances in history however, when this guidance could not be followed because of less than adequate levels of walleye production and priority management needs.

Emergence of VHSv in the Great Lakes Basin and Control Measures

VHSv is a fish virus not native to the Great Lakes that was first isolated by the Ontario Ministry of Natural Resources (OMNR) in 2005 while investigating a significant mortality of freshwater drum that occurred in the Bay of Quinte, Lake Ontario. Although this was the first report of VHSv in the Great Lakes, it was not the earliest identification of the virus. Biologists at Michigan State University had isolated an unknown virus from a muskellunge caught in Lake St. Clair in the spring of 2003, but did not pursue identification of the virus until learning of the OMNR isolation. Confirmation of the Lake St. Clair isolation as VHSv was made in December 2005. These reports of VHSv placed the virus into emerging pathogen status in the Great Lakes Basin. It is unknown how VHSv was introduced into the Great Lakes Basin. The most likely vector that moved VHSv into our waters is ballast water but other potential vectors are the movement of live fish including baitfish, and the natural migration of fish.

By the spring of 2006, large fish mortalities were observed in Lake St. Clair, the St. Clair River, the Detroit River, the western basin of Lake Erie, Lake Ontario, and the St. Lawrence River. These mortalities are thought to be a single large-scale fish kill event. Fish species affected

during the spring 2006 kill event included Great Lakes muskellunge, walleye, lake whitefish, burbot, freshwater drum, yellow perch, gizzard shad, redhorse sucker, and round goby. The disease was subsequently identified in several inland lakes in Michigan, Wisconsin, and Ohio as well.

VHSv is a fish disease reportable to the World Organization for Animal Health (OIE), which necessitates MI DNR reporting of occurrences to the United States Department of Agriculture – Animal and Plant Health Inspection Service (USDA – APHIS). VHSv can be transferred through the water via urine and reproductive fluids, and can survive in water for at least 14 days. The virus infects gill tissue first, and then progresses to internal organs and blood vessels. Blood vessels are weakened, which results in hemorrhaging of the internal organs, muscle, and skin. Fish can also become infected with the virus by eating other infected fish. Stresses on a fish such as extreme water temperatures, starvation, and spawning can lower immune responses, which could subsequently result in infected fish actually becoming diseased. Fish that survive VHSv infection develop antibodies that will protect the individual against additional infections for some time, but likely not indefinitely. Despite this natural inoculation of fish against further infection, the concentration of antibodies may eventually decrease leaving a fish susceptible to contracting the virus again later. Further study is still needed on this aspect of the disease to be certain of how long a fish may be protected from further infection.

Fisheries managers on the west coast of the United States have three decades of experience managing VHSv in salmon species, and have developed effective disinfection procedures for rearing salmon. Because the virus does not appear to penetrate the egg of salmon species, surface disinfection of eggs is effective in killing the pathogen and protecting hatcheries. To date, researchers have not been able to confirm the effectiveness of those disinfection procedures for the eggs of coolwater fish species such as walleye, northern pike, and muskellunge. Fisheries Division can not assume that disinfection procedures effective for salmon species will work as well for coolwater species, despite the methods having been recommended by the Great Lakes Fish Health Committee (GLFHC) of the Great Lakes Fishery Commission as appropriate. One key uncertainty remaining is that anti-clumping agents used in the rearing of coolwater fish eggs also have potential to bind the free iodine in the iodophor chemicals used for disinfection. This could reduce overall effectiveness of the methodology as iodine is the virus killing agent in these chemicals. We also don't know if the virus actually penetrates coolwater fish eggs which would likely reduce effectiveness of the surface disinfection method as well. In spite of the current unknowns with coolwater egg disinfection techniques, Fisheries Division uses the disinfection procedures as one component of a comprehensive biosecurity strategy for managing the risk involved for infecting the waters of the state or our hatcheries with VHSv.

The MI DNR considers VHSv a serious threat to both fish populations and hatcheries in the State of Michigan. Given the public trust responsibilities of the MI DNR, state fisheries management actions must not contribute to transporting or spreading this deadly fish disease. Given the strong likelihood that VHSv will remain present in Michigan waters for the foreseeable future, all fisheries management activities with a potential to spread the disease must include a thorough evaluation of the risks involved when taking those actions.

Management Timeline

2006 – By the time fish mortalities became evident in the spring of 2006, walleye, northern pike, and muskellunge production was already underway. There was no evidence to suggest the virus had spread to the broodstock source locations for those species, so MI DNR proceeded with normal production and stocking of all coolwater species that year.

MI DNR initiated statewide surveillance in 2006 to identify the occurrence and spread of VHSv in Michigan waters. Samples collected during this surveillance effort were sent to the Aquatic Animal Health Lab at Michigan State University. Samples were tested there for the presence of VHSv using standard cell culture and genetic techniques, with results available approximately one month after the cultures are started. Samples collected from the northern region of Lake Huron near Alpena and Rogers City in the fall of 2006 tested positive for VHSv; the only other positive location found in 2006 other than the St. Clair River, Lake St. Clair and Lake Erie area. The virus was isolated in samples of Chinook salmon, lake whitefish, and walleye, but no large scale fish kills of these species were observed at the time. Additionally, an archived lake whitefish collected near Cheboygan, MI in the late fall of 2005, obtained from the Chippewa Ottawa Resource Authority (CORA), also tested positive for VHSv.

Positive identification of VHSv in Lake Huron, along with previous findings led the MI DNR to designate large portions of the State's waters into three VHSv management areas; a VHSv Free Management Area; a VHSv Positive Management Area; and a VHSv Surveillance Management Area. Each area designation included special regulations for the fisheries operating in those waters. Those designations and rules are available by clicking the *Fishing* link at the MI DNR internet site (http://www.michigan.gov/dnr).

2007 – Extensive surveillance for VHSv continued statewide in 2007, largely coinciding with regularly scheduled fisheries surveys of inland lakes, streams, and the Great Lakes. Cell culture remained the method used for identifying presence of the virus. In 2007, MI DNR tested 8,933 samples from 62 inland and Great Lakes locations. Walleye brood sources from the Muskegon River, the Tittabawassee River, and Little Bay de Noc, muskellunge brood sources from Hudson Lake and Thornapple Lake, and our northern pike brood sources from Sanford Lake and Little Bay de Noc were all inspected and all tested negative for VHSv.

In May of 2007 however, VHSv was isolated in fish collected from Budd Lake in Clare County during investigation of a large fish kill that included black crappie, bluegill, golden shiner, largemouth bass, muskellunge, pumpkinseed, and yellow perch. Budd Lake is a land-locked waterbody with essentially no flow of water in or out, suggesting the source of VHSv in this case was from release or use of infected baitfish or illegally stocked infected gamefish. Samples collected later in the year, after the fish kill, failed to turn up additional positive detections of VHSv. With this occurrence in inland waters, one of the worst case scenarios relative to containing the disease was realized and highlighted the seriousness of the threat to the State's waters and hatcheries. VHSv was showing up in other locations across the basin as well. Samples collected in the spring of 2007 from Lake Winnebago in Wisconsin and from Green Bay on Lake Michigan tested positive for VHSv. Given the apparent spread of the virus across the Great Lakes including some inland waters, and a serious lack of information regarding the

transmission of VHSv in coolwater species, the MI DNR did not raise or stock any walleye in 2007 even though our brood sources all tested negative for the disease.

At the time, managers considered using large inland lakes as brood sources for walleye but this option was eventually dismissed because there are generally insufficient numbers of large adult walleye available in any inland lake to meet the egg needs for statewide production. That approach would also be extremely labor intensive and costly to accomplish due to the lack of a concentrated run like we see in the Great Lakes tributary stocks, and large public lakes considered to be best candidates to try as walleye broodstock sources also have the highest risk of becoming infected with VHSv through bait or some other vector. Using rearing locations off-site from our hatcheries, like remote field stations or trailers, was also evaluated but those options were dismissed too because of problems securing water sources, our inability to adequately staff such locations, and the high cost to implement such activities. There was some small-scale stocking of walleye done in 2007 by CORA and other limited private stockings were approved when fish sources were confirmed VHSv free.

2008 – Surveillance for VHSv, using USDA-APHIS surveillance funding, continued in all Great Lakes States and Provincial waters in the basin. Few samples collected during these efforts tested positive for VHSv. Cell culture remained the standard used to accurately identify VHSv, using Polymerase Chain Reaction (PCR) as a confirmatory test. The occurrences of VHSv expanded further in 2008 to include a new inland detection in Clear Fork Reservoir, Ohio, the first water outside of the Great Lakes Basin, and new Great Lakes detections in Illinois and Wisconsin waters of Lake Michigan. In 2008, MI DNR tested 7,156 samples collected from 57 Great Lakes and inland locations. None of the fish tested by MI DNR were positive for VHSv. MI DNR also tested 650 samples from our walleye broodstocks over multiple occasions in 2008 and all were negative for VHSv. Muskellunge and northern pike broodstock sources were again sampled and tested in 2008 and likewise, all were negative for VHSv. Samples collected from Budd Lake in 2008 were also negative.

In response to the continued negative results of our surveillance testing on broodstock sources for walleye MI DNR began a limited rearing program in 2008. Stringent restrictions were placed on broodstock sources, disinfection procedures, disease testing regimes, and biosecurity measures. In addition, MI DNR aimed to further minimize risk of spreading the disease to inland waters and the state hatcheries by carefully selecting rearing pond and stocking locations around the state.

Walleye Broodstock Sources – Given that VHSv had caused large scale fish kills in the Lake St. Clair-Lake Erie basin along with a fish kill in the Lake Huron Basin, the Tittabawassee River broodstock source was considered the highest risk for VHSv transfer. The Little Bay de Noc source population represented the second highest risk for transferring the disease because VHSv was found in southern Green Bay. The Muskegon River brood source was believed to have the lowest risk for transferring VHSv because it was furthest away from previous detections of the virus at that time. Consequently, a decision was made to use only the Muskegon River population as a brood source for walleye production in 2008.

Disinfection Procedures – Despite documented success disinfecting eggs of salmon species on the west coast, researchers remained unable to confirm the effectiveness of egg disinfection procedures in killing VHSv on coolwater fish eggs in 2008. Egg infectivity trials at Cornell University were inconclusive, in spite of premature media reports to the contrary. MI DNR experiments to determine the effectiveness of iodine disinfection techniques have been unsuccessful because we were unable to collect eggs from infected wild fish. Artificially infecting eggs with VHSv has also proven undoable to this point, so we haven't pursued *in vitro* experiments either.

Notwithstanding the uncertainties regarding effectiveness of the disinfection protocols for coolwater fish eggs, the GLFHC recommended that fisheries management agencies still implement surface treatment of all non-salmonid eggs from Great Lakes wild fish sources with iodophor, at a prescribed concentration and duration, during water hardening of those eggs, and prior to bringing the eggs into the hatchery. While Fisheries Division can not assume this disinfection procedure is completely effective in killing VHSv associated with coolwater fish eggs, there is no evidence to suggest it causes any harm, so the method is used as part of our egg collection and incubation protocols.

Disease Testing Regimes – All three Michigan walleye broodstocks were tested in February 2008 prior to normal spawning and again at the time of spawning. In addition to the standard 60-fish used for full health inspection, all adults used for spawning were sacrificed and tissue samples collected specifically for VHSv testing. Fish sacrificed were filleted by Fisheries Division staff and donated to local shelters because VHSv is not a human pathogen and presents no consumption risk for people. If any adult walleye tested positive for VHSv, all eggs and/or fry produced from those eggs would have been destroyed statewide. None of the adult fish used for spawning tested positive for VHSv. Additional screening of walleye fry occurred later in the production process wherein 1,500 fish from each day's egg take were collected and submitted for VHSv testing again. None of these fish tested positive for VHSv either. As noted above, we required that all adults used for egg collection and spawning be VHSv negative prior to transferring fry hatched from those eggs to rearing ponds. That requirement does not ensure fry will not be exposed to the virus because rearing ponds have open water sources. Because of this, spring fingerlings from all rearing ponds in production in 2008 were also tested prior to any fish being stocked. As with adults used for egg collection and spawning, had any fingerlings from a rearing pond tested positive for VHSv all fish from that pond would have been destroyed rather than being used to stock a waterbody.

Biosecurity Measures – The GLFHC made several recommendations for protecting hatchery operations from infection with VHSv. Those recommendations were organized separately for coolwater and salmonid culture, but both basically stressed similar protective measures including: testing source waters for egg takes and eventual use of gametes; implementing disinfection methods; annual testing and standard fish health inspection protocols for both broodstock and production lots; hatchery fish health certifications; and considerations for developing protected Great Lakes salmonid and non-salmonid broodstock lines. Other general hatchery operational guidance included requiring that eggs moved between hatchery facilities be surface disinfected using an iodophor compound prior to transfer, and that hatchery equipment and trucks be fully disinfected after each use. Fisheries Division has incorporated many, if not

all, of these measures towards protecting our state hatcheries from infection with VHSv. Implementing these measures seems immaterial however, in comparison to one other recommendation of the GLFHC.

The most ominous recommendation coming from the GLFHC was that agencies should destroy all fish at hatchery facilities found to be infected with VHSv. That recommendation is consistent with the OIE Aquatic Animal Health Code. Inclusion of such a recommendation by these multi-agency and international animal health organizations highlights the seriousness that infecting a hatchery with VHSv poses in the minds of numerous veterinarians, researchers, and experts alike; no matter how unthinkable such an outcome is for the local agency involved.

The cost of having to depopulate and disinfect an entire hatchery in Michigan is astronomical in many ways, and the idea that such a thing might happen with VHSv should be taken very seriously. In the mid 1980s, Fisheries Division was faced with just such a catastrophe. The Marquette State Fish Hatchery was depopulated and disinfected because a viral agent, Epizootic Epitheliotropic Disease Virus (EEDv), had been identified as the cause of enormous mortalities in the lake trout produced there and at another federally operated hatchery. This came at a significant cost to the division in terms of dollars lost and was a major setback to lake trout restoration efforts underway at the time. Taking appropriate biosecurity measures to avoid having to go through something similar today is obviously critical.

In 2008, to minimize the risk of infecting our fish production system, walleye egg incubation was limited to the Thompson State Fish Hatchery because the incubation room there could be partially isolated from other rearing areas by constructing a wall and reconfiguring the plumbing. Unfortunately, the Thompson State Fish Hatchery was designed as a coldwater fish hatchery in the 1970s and, along with the Wolf Lake Hatchery, rears steelhead for stocking into Michigan waters. All coolwater production capabilities, including our attempts to isolate the walleye incubation area, are retrofits aimed at making the best of a facility that was not designed for this purpose. Partial isolation of the incubation room at the Thompson State Fish Hatchery reduces the risk of spreading VHSv infection to other species being reared there, but does not ensure 100% elimination of the risk. As an additional precaution, all steelhead eggs normally incubated at Thompson State Fish Hatchery moved to Wolf Lake State Fish Hatchery for incubation. Steelhead eggs were not transferred to Thompson State Fish Hatchery for rearing until walleye fry had been transferred to rearing ponds and disinfection of the incubation area had been accomplished.

Selection of Rearing Ponds and Stocking Locations – The final precaution against spreading VHSv to previously uninfected waters was to be highly selective in our use of rearing ponds and stocking locations. Rearing ponds were limited to those without connections to other surface waters and not drainable which provides the opportunity to effectively control any outbreak of VHSv in our walleye. Walleye stocking was limited to using spring fingerlings which were only stocked into inland lakes without inlets or outlets, or into inland lakes with immediate connections to a Great Lake already designated as a VHSv Positive or Surveillance Management Area. As such, absolutely no walleye rearing or stocking took place in the Lake Superior Basin which is still designated a VHSv Free Management Area. No direct stocking of walleye from rearing ponds occurred because of the 28 days required to complete testing using cell culture.

This conservative approach to rearing and stocking walleye in inland waters was far safer than implementing full production after the hiatus, but it also greatly reduced the number of active rearing pond partnerships and acceptable stocking sites statewide.

2009 – Surveillance for VHSv will continue in all Great Lakes States and Provincial waters in 2009, although at a lower level because of budget constraints. Michigan's surveillance plan is still being finalized but we anticipate collecting a slightly lower number of samples to previous years from Great Lakes and inland locations because of reductions in available funds for surveillance. MI DNR will again test walleye broodstock sources from the Muskegon River, the Tittabawassee River, and Little Bay de Noc, as well as muskellunge brood sources from Hudson Lake and Thornapple Lake, and our northern pike brood sources from Sanford Lake and Little Bay de Noc in 2009.

Several key questions about VHSv remain unanswered and will again limit our coolwater fish production in 2009. Chief among those unknowns is the effectiveness of standard iodophor disinfection techniques in killing VHSv on cool water fish eggs, and our need to find faster, more reliable ways to detect the virus in fish samples. Ongoing research at Cornell University, along with the New York State Department of Environmental Conservation, is being focused on these essential aspects for managing the disease and we believe significant progress will be made this year towards understanding the effectiveness of our disinfection methods in killing VHSv associated with coolwater fish eggs and development of rapid VHSv detection tools.

Other gaps in our understanding about VHSv that have huge management implications include: knowing how long the virus can survive outside of a fish host; finding reliable ways to detect VHSv in the water prior to fish kill events; understanding how the immune response in fish may provide protection against future infections; and quantifying the full range of susceptibility for various Great Lakes fish species to the disease. Without major progress in these areas it is hard to imagine how MI DNR will effectively manage the risk of spreading VHSv to our hatcheries and inland waters or significantly expand our cool water fish production back to former levels. Research is ongoing in each of these areas and we anticipate some new information in 2009 with more complete results becoming available in 2010.

Walleye Brood Sources – Walleye production will expand slightly in 2009 to make use of both Muskegon River and Little Bay de Noc broodstocks. Because VHSv was found in southern Green Bay and southwest Lake Michigan, we believe the addition of the Little Bay de Noc strain presents no more risk of transferring VHSv into our hatcheries than the Muskegon River strain does alone. Our decision was also made in light of the fact that CORA had used this same broodstock source in 2008 and extensive testing of those fish at the time also came back negative for VHSv.

Despite no detections of VHSv in Tittabawassee River walleye, it is our opinion that close proximity of this broodstock source to places where the virus caused large fish kills makes this location a higher risk than the other two for having diseased fish. Although using Tittabawassee River broodstock would provide the preferred genetic strain for stocking into the Lake Huron watershed, research has determined little genetic difference between Muskegon River and Tittabawassee River walleye. This is not surprising given the original source used to rehabilitate

the Tittabawassee River fish was the Muskegon River broodstock, and insufficient time has transpired to allow for significant genetic divergence or selection to occur. Consequently, eliminating the Tittabawassee River walleye as a brood source will not further restrict our plans for stocking walleye in the Lake Huron basin.

Because of differences in the timing of walleye spawning runs in the Muskegon River and Little Bay de Noc, using both brood sources will allow crews to run egg-take operations over a longer period and improve other program efficiencies to provide an expanded program in 2009. Incubation of walleye eggs at a state owned facility will again be limited to the Thompson State Fish Hatchery. Hatching eggs at the Thompson State Fish Hatchery alone however, still limits production to 6 million fry; thus, walleye production in 2009 would benefit by adding incubation facilities outside of the state hatchery system. Two such facilities are being considered. One is owned and would be operated by the Mason County Walleye Association (MCWA) near Ludington. The Nunn's Creek Fish Hatchery in Hessel, owned by CORA, is the other possibility. A review of the suitability of the Ludington facility is being completed and it may be possible to initiate a pilot program this spring if the facility is found to be acceptable. CORA successfully hatched walleye fry from Little Bay de Noc eggs taken in 2008 at their Nunn's Creek Fish Hatchery and their assistance will be solicited in 2009. Adding these two facilities would increase the number of fry available for stocking without putting our fish production facilities and stocks at any additional risk.

Disease Testing Regime – As in 2008, testing for VHSv in 2009 will begin with pre-spawn testing of adult walleye in the Muskegon River and Little Bay de Noc. If any fish test positive for VHSv, eggs taken during actual spawning runs at that location will only be used to experiment with egg disinfection protocols and will not be used in our walleye production. The second round of testing will require sacrificing all adult walleyes used for the egg takes in the Muskegon River and Little Bay de Noc so we can collect kidney and spleen samples for VHSv testing. Ovarian fluid and milt samples will also be collected from these fish at the same time. If the virus is found in a kidney or spleen sample we will test the ovarian fluid or milt collected from the same fish to determine if non-lethal sampling methods can provide reliable results. Fillets from all walleye sacrificed for testing will again be donated to local food banks. The third round of testing will evaluate walleye fry for presence of VHSv. Since the results of tests are not available prior to transferring fry to rearing ponds, this evaluation really only provides us with an early warning of the existence of the virus and the ability to track the transmission of the virus should it be detected in any of the walleye life stages we are dealing with in this program. Any positive detection of VHSv from fish being reared in a pond will lead to all fish from that rearing pond being destroyed. The fourth round of testing will again target spring fingerlings from rearing ponds to ensure VHSv was not transmitted via water in the ponds. If any fingerlings from a rearing pond test positive for VHSv all fish from that pond will be destroyed. Because of this extensive testing regime at each life stage in our rearing process we believe the possibility of transferring VHSv through our activities is extremely low but not zero.

Selection of Rearing Ponds and Stocking Locations – In 2009, MI DNR will implement the same rearing pond and stocking location criteria used in 2008. Fisheries Division will only use rearing ponds that are non-drainable and without connections to other surface waters. Walleye fingerlings may only be stocked into waterbodies isolated from other inland waters, or those with

an open connection to the Great Lakes. Absolutely no walleye will be reared or stocked in the Lake Superior drainage in 2009 because the basin remains a VHSv Free Management Area.

For now, disinfection procedures and biosecurity measures will remain the same in 2009 as those used in 2008 and will be incorporated into the expanded program. If new tools become available in a timely fashion for incorporating into the 2009 walleye rearing and stocking program we will implement those as appropriate.

Other Coolwater Fish Species – As in 2008, there will be no production of northern pike in 2009. We are confident however, that biosecurity measures and disease testing regimes will be in place to begin rearing this species again in 2010.

Muskellunge production will continue in the same manner as 2008. Eggs will be taken from Thornapple Lake and Lake Hudson where we have historical fish health inspection data showing the stocks are VHSv negative. Non-lethal samples will be collected from all fish spawned and handled including blood, milt, and ovarian fluid for VHSv testing. Eggs will be incubated and fry reared at the Wolf Lake State Fish Hatchery in a building located away from the coldwater production building with appropriate biosecurity measures in place to protect the entire hatchery complex from possible VHSv infection. Fry will be tested for VHSv when the yolk sacs are absorbed, and if negative, surplus fry and fingerlings will be available for stocking into approved waters. Fingerlings will receive a full health inspection, including testing for VHSv, prior to any fall stocking. To further protect other important species from possible infection, we will forego a lake sturgeon egg take for rearing in this hatchery. In 2009, lake sturgeon rearing will be limited to stream-side facilities on the Black River (Cheboygan County), Cedar River (Menominee County), Whitefish River (Alger County), and Ontonagon River (Ontonagon County).

Coolwater Fish Production in 2010 and Beyond – It's a fine line between responsible natural resources policy and accomplishing all that stakeholders want when faced with a problem as widespread and potentially harmful as VHSv. This is especially true when the threat to our fish populations, lakes and streams, or hatcheries seems to have passed and the detrimental impacts are no longer obvious. Still, it is our job to protect, conserve, and manage the fisheries resources of Michigan for the use and enjoyment of current and future generations. We know that protecting first is always less expensive and preferable to restoring lost fisheries later, particularly when the future funding and capacity for such work is so uncertain.

We certainly recognize that local walleye fisheries and rearing pond partnerships have suffered while we learn how to protect the State's resources from VHSv. To be sure, we value those fisheries and partnerships very much and look forward to reinvigorating those relationships soon. When we do, it will be with the same energy and commitment as ever, but also with the peace of mind knowing we are doing all that is possible to manage this threat to the fisheries resources of Michigan. We appreciate the continued patience and understanding of our stakeholders directly impacted by the limited coolwater production in recent years and thank you for your support.